EFFECT OF MANAGMENT PRACTICES IN A CONTINUOUS WHEAT ROTATION ON CROP YIELDS

S.A. Brandt and K.J. Kirkland

Agriculture Canada Experimental Farm

Scott, Saskatchewan

The practice of summerfallowing has been implicated as a major factor contributing to soil degradation through loss of organic matter, salinization and soil erosion. The practice of extending crop rotations, where the frequency of summerfallowing is reduced or eliminated has been proposed as a means of decreasing soil degradation. Several studies have been undertaken to investigate effects of management practices on wheat yields in extended rotations. However, most of these studies were designed to investigate a single management factor. This study was initiated to investigate effects of stubble management, weed control and fertilizer practices and interactions of these factors on yields of hard red spring wheat grown in a continuous wheat rotation.

A complete description of the experimental design, locations and soil types, treatments used and methods of conducting the studies is given in the preceeding paper "Effect of Management Practices in a Continuous Wheat Rotation on Weed Populations - K.J. Kirkland and S.A. Brandt." Statistical analyses were performed for each of the five locations and each of the four years of the study. In addition, data was combined for each location over the four years and analysed and finally the data for locations and years was combined and analysed.

SCOTT: A summary of the results of statistical analyses performed on the yield data for Scott is given in Table I. Stubble treatments alone did not significantly affect yields at this location (Table I and 2). Herbicide treatments had a significant affect on yields in three of the four years. In 1983, 1985 and 1986 the untreated check yielded significantly less than where herbicides were applied (Table 3). In 1983, the Hoegrass-Buctril M treatment yielded significantly more than the Hoegrass - Glean; Hoegrass - Torch and Avadex BW - 2,4-D treatments. In 1984, severe drought stress late in the growing season resulted in very low yields. Yield differences between herbicide treatments were not significant despite very pronounced differences in weed control particularly between the untreated check and herbicide treated plots. In 1985 and 1986 the Avadex - 2,4-D treatment yielded significantly less than the Hoegrass - Glean, Hoegrass - Torch and Hoegrass - Buctril M treatments. The yield reduction occurred primarily due to lack of green foxtail control with the Avadex - 2,4-D treatment compared with treatments where Hoegrass was applied.

Fertilizer treatments had a highly significant effect on yields in all years at Scott (Table I). Fertilizer application increased yields in 1983, 1985 and 1986 compared with the check and decreased yields in 1984 (Table 4). The yield reduction in 1984 where fertilizer was applied appeared to be related to severe drought stress that occurred late in the growing season. The fertilized treatments developed a heavier growth early in the season and appeared to suffer more from the dry conditions occurring later. The higher

rate of fertilizer increased yields more than the lower rate in 1983, 1985 and 1986 and decreased yields more than the lower rate in 1984. Overall, yield increases from the higher rate of fertilizer were not adequate to offset the costs of this treatment, whereas responses from the lower rate compared to the check would more than offset the costs involved.

TABLE I Summary of Statistical Analyses Performed on Yield Data for Scott

	Year				
Factor	1983	1984	1985	1986	1983-86 Avg.
Stubble trt. (S)	NS	NS	NS	NS	NS
Herbicide trt. (H)	**	NS	**	**	**
S X H	NS	*	NS	NS	NS
Fertilizer trt. (F)	**	**	**	**	**
S X F	NS	NS	NS	NS	NS
H X F	*	NS	NS	NS	NS
S X H X F	NS	NS	NS	NS	NS

NS - not significant

* - significant at 5% probability

** - significant at 1% probability

TABLE 2 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Scott - Stubble Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Fall Tillage	1254	640	1351	3033	1569
Normal Height Stubble	1400	601	1692	3118	1703
Tall Stubble	1383	646	1622	3268	1730
LSD (P=0.05)*	NS	NS	NS	NS	NS

* NS - differences between treatments are not significant

TABLE 3 Yields (kg/ha) of wheat in a Continuous Wheat Rotation at Scott - Herbicide Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Check - no Herbicide	1000	569	1201	2268	1260
Hoegrass - Glean	1444	629	1650	3370	1773
Hoegrass - Torch	1444	647	1716	3566	1843
Hoegrass - Buctril M	1522	645	1785	3466	1855
Avadex B W - 2,4-D	1439	723	1390	3131	1671
LSD (P=0.05)*	74	NS	123	234	94

* Differences between treatments in a vertical column that are greater than the LSD value are statistically significant. NS = not significant.

TABLE 4 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Scott - Fertilizer Treatment Effects

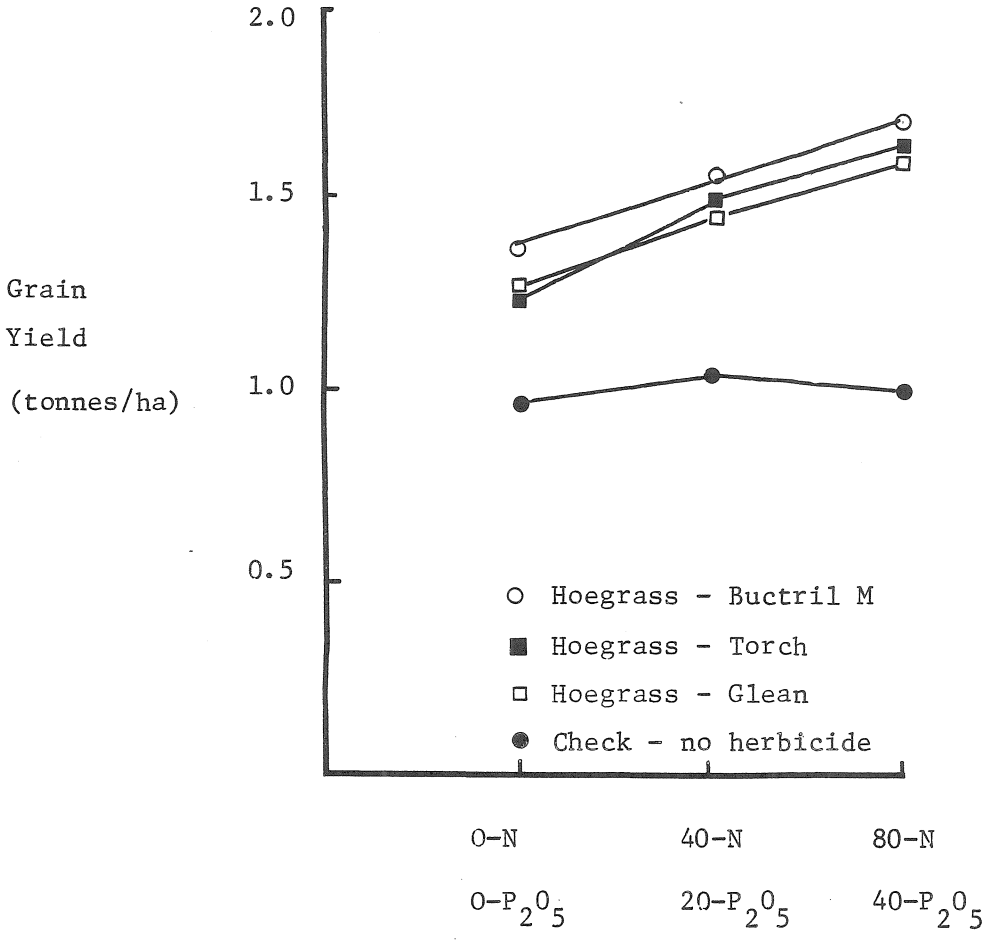
Treatment (kg/ha of N and P_2O_5)	Year 1983	1984	1985	1986	1983-86 Avg.
Check - no fertilizer	1190	692	1331	2245	1365
40-N 20 - P_2O_5	1364	631	1628	3560	1796
80-N 40 - P_2O_5	1481	563	1705	3613	1841
LSD (P=0.05)*	56	40	69	142	48

* Differences between treatments in a vertical column that are greater than the LSD value are statistically significant.

The herbicide X fertilizer interaction was significant at Scott in 1983 and indicated that fertilizer responses were quite small where herbicides were not used but were significant where weeds were controlled with herbicide treatments (Figure I). This interaction likely occurred because weed populations were quite high and were quite competitive with the crop and were in a better position to benefit from the fertilizer applied.

In 1984 the stubble treatment X herbicide interaction was significant. Where no herbicide was applied yields for the three stubble treatments were similiar. Several differences between stubble treatments occurred where herbicides were applied. However, the difference varied depending upon the herbicide used, making it difficult to explain the yield responses.

FIGURE I Effect of Herbicides on Yield Responses to Fertilizer In a Continuous Wheat Rotation at Scott in 1983.



KINDERSLEY: At Kindersley in the Brown Soil Zone stubble treatments had a significant effect on yields in 1983 and when all years of data were analysed (Table 5). Both herbicide and fertilizer treatments had a highly significant effect on yields in all years of the study and some interactions occurred in some years.

TABLE 5 Summary of Statistical Analyses Performed on Yield Data for Kindersley

Factor	1983	1984	1985	1986	1983 - 86 Avg.
Stubble trt. (S)	*	NS	NS	NS	*
Herbicide trt. (H)	**	**	**	**	**
S X H	NS	NS	NS	NS	NS
Fertilizer trt. (F)	**	**	**	**	**
S X F	*	NS	NS	NS	NS
H X F	*	NS	NS	NS	*
S X H X F	NS	NS	NS	NS	NS

NS - not significant

* - significant at 5% probability

** - significant at 1% probability

In 1983, leaving a tall stubble to trap snow resulted in significantly higher yields than where the stubble was left at a normal swathing height (15 - 20 cm) or where fall tillage was performed to flatten the stubble (Table 6). When the four years of data were analysed together, the tall stubble treatment also resulted in higher yields than where other stubble treatments were used.

TABLE 6 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation At Kindersley - Stubble Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983-86 Avg.
Fall Tillage	1488	2160	1443	2281	1843
Normal Height Stubble	1522	2334	1387	2368	1903
Tall Stubble	1806	2464	1555	2275	2025
LSD (P-0.05)'	175	NS	NS	NS	89

' Difference in yields in a vertical column that are greater than the LSD value are statistically significant. NS = not significant

Application of herbicides increased yields over the check treatments in all years except for the Avadex BW plus 2,4-D treatment in 1984 (Table 7). In 1984, 1983 and the four year average, the Avadex BW plus 2,4-D treatment resulted in significantly lower yields than where other herbicides were used.

Four year average yields from the Hoegrass - Glean treatment were higher than for other herbicide treatments presumably because of better control of wild mustard and cow cockle.

Fertilizer application increased yields in all years and the higher rate resulted in significantly higher yields than the lower rate in all years except 1984.

TABLE 7 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Kindersley - Herbicide Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Check - no Herbicide	1364	1744	1166	2015	1573
Hoegrass - Glean	1608	2674	1590	2621	2123
Hoegrass - Torch	1754	2611	1563	2278	2051
Hoegrass - Bactril M	1782	2473	1524	2304	2021
Avadex BW - 2,4-D	1521	1800	1540	2347	1802
LSD (P=0.05) '	103	137	93	238	60

' Yields in a vertical column that differ by more than the LSD are statistically significant.

TABLE 8 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation At Kindersley - Fertilizer Treatment Effects

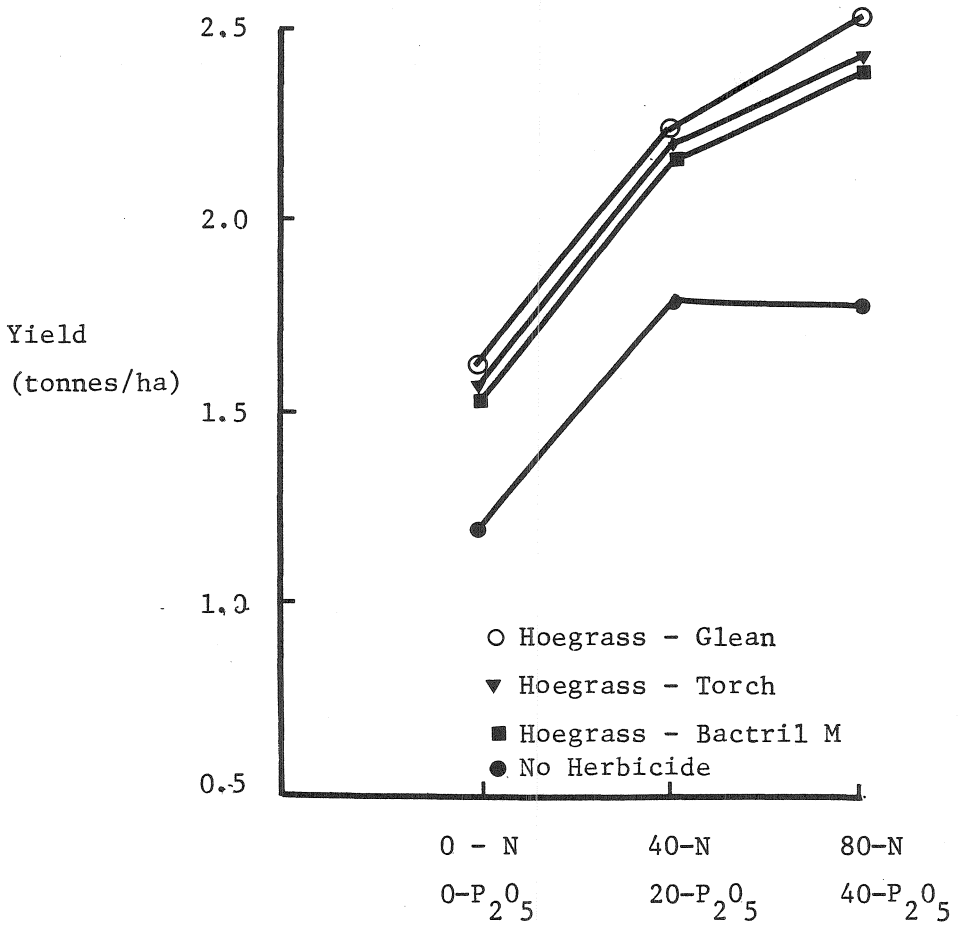
Treatment (kg/ha of N and P_2O_5)	Year 1983	1984	1985	1986	1983 - 86 Avg.
Check - no fertilizer	897	1992	1042	1877	1452
40 - N 20 - P_2O_5	1769	2511	1597	2444	2081
80 - N 40 - P_2O_5	2150	2456	1747	2602	2239
LSD (P=0.05)'	76	90	71	94	48

' Yields in a vertical column that differ by more than the LSD value are statistically significant.

The herbicide X fertilizer interaction was significant in 1983 as well as for the four year average. Over the four years yield responses to the high rate of fertilizer were similar to the low rate where no herbicide were used (Figure 2). Where herbicides were used yields from the high fertilizer rate were significantly higher than from the low rate.

The stubble X fertilizer interaction was significant in 1983. Where the tall stubble treatment was used, fertilizer responses were significantly higher than where fall tillage or normal height stubble were used (data not shown).

FIGURE 2 Effect of Herbicide on Yield Responses to Fertilizers in a Continuous Wheat Rotation at Kindersley (1983 - 86 Average)



LASHBURN: At Lashburn in the Black Soil Zone, significant yield responses to stubble and herbicide treatments occurred in 1983, 1985 and 1986 as well as the four year average (Table 9). Significant fertilizer and stubble X fertilizer responses occurred in all years.

TABLE 9 Summary of Statistical Analyses Performed on Yield Data for Lashburn

	Year				
Factor	1983	1984	1985	1986	1983 - 86 Avg.
Stubble trt. (S)	**[1]	NS	**	*	**
Herbicide trt. (H)	**	NS	**	**	**
S X H	NS	NS	NS	NS	NS
Fertilizer trt. (F)	**	**	**	**	**
S X F	**	**	**	**	**
H X F	NS	NS	NS	NS	NS
S X H X F	NS	NS	NS	NS	NS

[1] ns - not significant

* - significant at 5% probability

** - significant at 1% probability

In 1983 and 1985 the tall stubble treatment resulted in yields that were significantly higher than where fall tillage or normal height stubble were used (Table 10). The same relationship between yields and stubble treatments occurred for the four year average. In 1986, normal height stubble resulted in significantly lower yields.

TABLE 10 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Lashburn - Stubble Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Fall tillage	1808	1940	1729	3197	2168
Normal height stubble	1822	1851	1953	2841	2117
Tall stubble	2284	2016	2541	3187	2507
LSD (P=0.05)'	187	NS	190	189	138

' Yields in a vertical column that differ by more than the LSD value are statistically significant. NS - not significant.

In all years one or more of the herbicide treatments increased yields over the untreated check treatment (Table 11). However, only the Hoegrass plus Torch treatment increased yields in all years of the study.

TABLE 11 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Lashburn - Herbicide Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983-86 Avg.
Check - no herbicide	1823	1854	1920	2963	2140
Hoegrass - Glean	2028	1980	2124	3007	2285
Hoegrass - Torch	2039	1999	2119	3125	2320
Hoegrass - Buctril M	2081	1885	2254	3139	2340
Avadex BW - 2,4-D	1821	1963	1892	3336	2253
LSD (P=0.05)'	80	92	95	102	66

' Yields in a vertical column that differ by more than the LSD value are statistically significant.

Application of fertilizer increased yields over the unfertilized check treatment in all years but the higher rate increased yields over the lower rate in 1985 and 1986 only (Table 12).

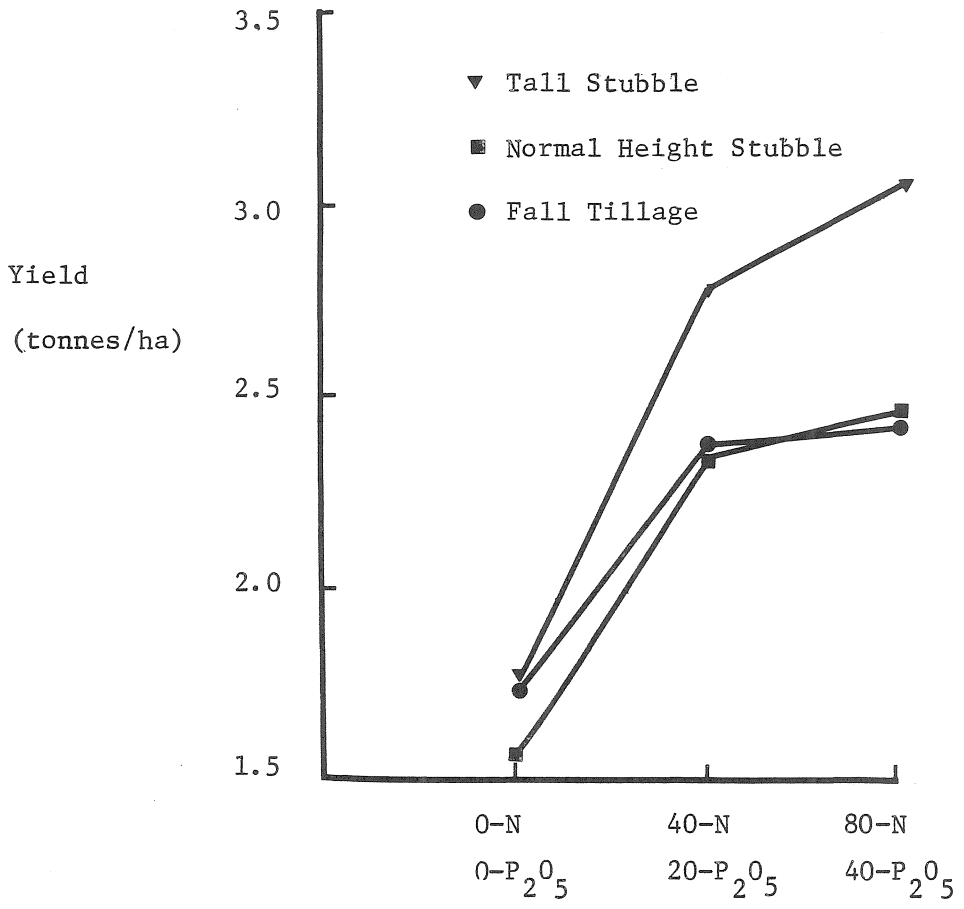
The significant interaction of stubble treatments with fertilizer treatments indicated that where tall stubble was used fertilizer responses were greater than where normal height stubble or fall tillage were used (Figure 3).

TABLE 12 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Lashburn - Fertilizer Treatment Effects

Treatment (kg/ha of N and P_2O_5	Year 1983	1984	1985	1986	1983-86 Avg.
Check - no fertilizer	1298	1643	1734	1988	1666
40 - N 20 - P_2O_5	2275	2071	2194	3432	2493
80 - N 40 - P_2O_5	2341	2093	2294	3805	2633
LSD (P=0.05)'	84	154	65	85	49

' Yields in a vertical column that differ by more than the LSD value are statistically significant.

FIGURE 3 Effect of Stubble Treatments on Yields Responses to Fertilizers in a Continuous Wheat Rotation at Lashburn (1983 - 86 Average)



MERVIN: On a Grey-black transition soil near Mervin the herbicide and fertilizer treatments generally had a significant effect on yields and the stubble X fertilizer interaction was generally significant (Table 13). Stubble treatments significantly affected yields only in 1985.

Table 13. Summary of Statistical Analyses Performed on Yield Data for Mervin

	Year				
Factor	1983	1984	1985	1986	1983-86 Avg.
Stubble trt. (S)	NS'	NS	*	NS	NS
Herbicide trt. (H)	NS	*	**	**	**
S X H	NS	NS	NS	NS	NS
Fertilizer trt. (F)	**	**	**	**	**
S X F	**	NS	**	NS	**
H X F	NS	NS	NS	NS	NS
S X H X F	NS	NS	NS	NS	NS

'NS - not significant
* - significant at P = 0.05
** - significant at P = 0.01

The normal height stubble treatment resulted in significantly higher yields than tall stubble or fall tillage in 1985 only. This site was somewhat protected by trees which may have reduced the effectiveness of snow trapping practices, although it was open to the prevailing North-west winds.

TABLE 14 Yields (kg/ha) of wheat grown in a continuous wheat rotation at Mervin. - Stubble Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Fall Tillage	2336	2818	2455	2750	2590
Normal Height Stubble	2441	2881	2690	2689	2675
Tall Stubble	2256	2630	2583	2584	2513
LSD (P = 0.05)'	NS	NS	102	NS	NS

'Yields in a vertical column that differ by more than the LSD value are statistically significant. NS - yield differences are not significant.

The Hoegrass - Glean and Hoegrass - Torch herbicide treatments increased yields over the untreated check in 1984 and subsequent years (Table 15). These two treatments generally provided the most consistent responses at the Mervin site. The Hoegrass - Buctril M treatment increased yields over the check in 1985 and 1986 but when taken over the four years was significantly lower yielding than the Hoegrass - Glean and Hoegrass - Torch treatments. The Avadex BW - 2,4-D treatment increased yields over the check in 1985 only and over the four years was not significantly higher yielding than the check treatment.

TABLE 15 Yields (kg/ha) of Wheat in a Continuous Wheat Rotatation at Mervin - Herbicide Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Check - no herbicide	2264	2728	2295	2343	2408
Hoegrass - Glean	2376	2880	2755	2833	2711
Hoegrass - Torch	2444	2865	2666	3033	2752
Hoegrass - Buctril M	2304	2615	2652	2659	2535
Avadex B W - 2,4-D	2272	2670	2460	2330	2433
LSD (P=0.05)'	NS	115	96	229	103

' Yields in a vertical column that differ by more than the LSD value are statistically significant. NS - yield differences are not significant.

Fertilizer applications increased yields over the unfertilized check in all years at this location (Table 16). The higher rate resulted in significantly higher yields than the lower rate in 1984 and subsequent years.

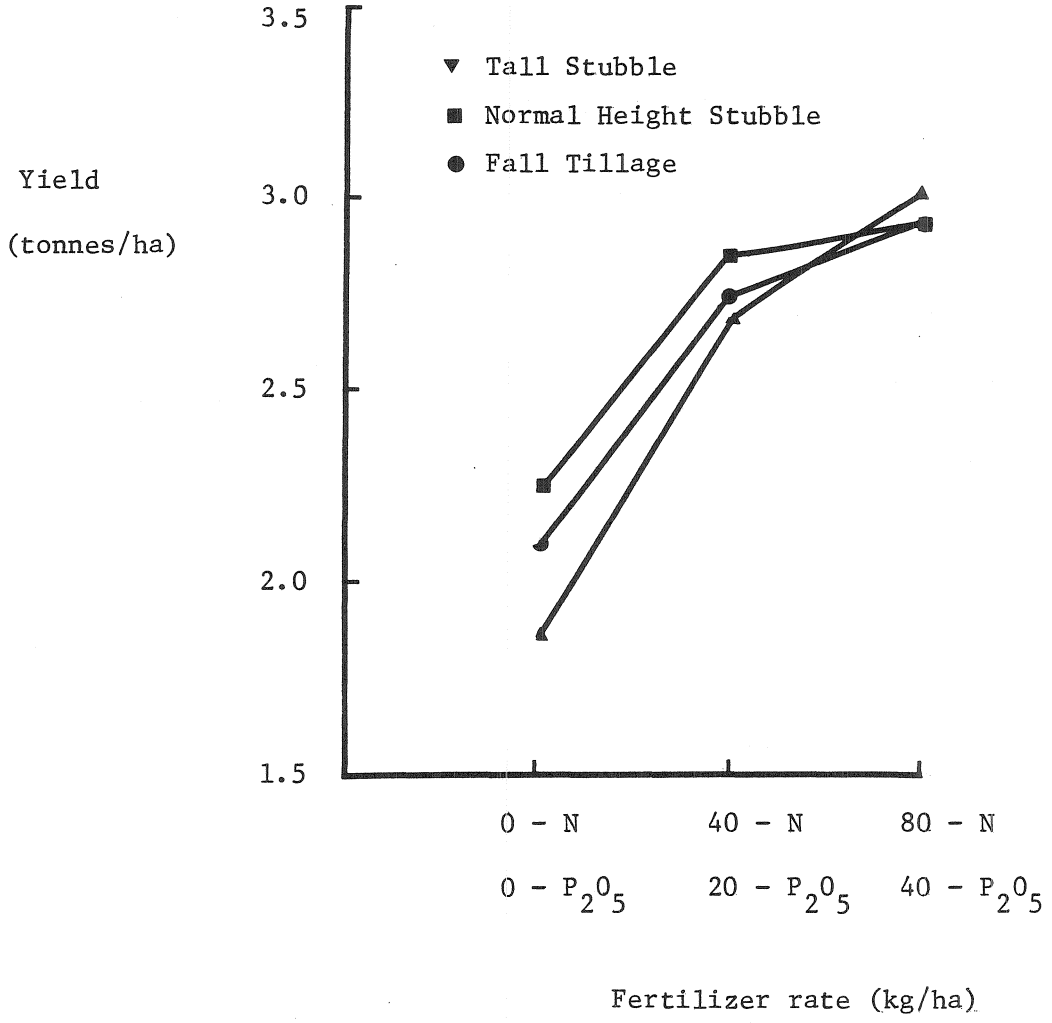
TABLE 16 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Mervin - Fertilizer Treatment Effects

Treatment (kg/ha of N and P_2O_5)	Year				
	1983	1984	1985	1986	1983 - 86 Avg.
Check - no fertilizer	2050	2358	2135	1679	2056
40 - N 20 - P_2O_5	2586	2910	2705	2870	2767
80 - N 40 - P_2O_5	2389	3061	2887	3475	2955
LSD (P=0.05)'	102	55	81	97	56

' Yields in a vertical column that differ by more than the LSD value are statistically significant.

The stubble X fertilizer interaction was significant in 1983 and 1985 as well as the four year average (Table 13). Where tall stubble was used, yields of the unfertilized treatment tended to be lower than where fall tillage or normal height stubble were used (Figure 4) and was somewhat lower where the 40 kg/ha rate of N plus 20 kg/ha of P_2O_5 was used. Where fall tillage plus the highest rate of fertilizer was used yields were not significantly different than where the same fertilizer rate with fall tillage or normal height stubble were used.

FIGURE 4 Effect of Stubble Treatments on Yield Responses to Fertilizers in a Continuous Wheat Rotation at Meryin (1983 - 86 Average)



LOON LAKE: On a Gray - Wooded soil near Loon Lake, fertilizer treatments had a significant effect on yields in all years of the study and herbicide treatments significantly affected yields in all years except 1983 (Table 17). Stubble treatments had a significant effect in 1983 and the four year average.

TABLE 17 Summary of Statistical Analyses Performed on Yield Data from Loon Lake

	Year				
Factor	1983	1984	1985	1986	1983 - 86 Avg.
Stubble trt. (S)	NS'	NS	*	NS	*
Herbicide trt. (H)	NS	**	**	**	**
S X H	NS	NS	NS	NS	NS
Fertilizer trt. (F)	**	**	**	**	**
S X F	NS	NS	NS	**	NS
H X F	*	NS	NS	**	NS
S X H X F	*	NS	NS	NS	NS

NS - not significant

* - significant at P = 0.05

** - significant at P = 0.01

Leaving a tall standing stubble increased yields over the fall tillage and normal height stubble treatments in 1983 (Table 18). Over the four years, both the tall and normal height stubble treatments increased yields over the fall tillage treatment.

TABLE 18 Yields (kg/ha) of Wheat Grown in a Continuous Wheat Rotation at Loon Lake - Stubble Treatment Effects

	Year				
Treatment	1983	1984	1985	1986	1983 - 86 Avg.
Fall Tillage	990	2603	2253	1153	1750
Normal Height Stubble	1131	2781	2361	1170	1861
Tall Stubble	1057	2601	2538	1242	1859
LSD (P = 0.05)'	NS	NS	135	NS	64

' Yields in a vertical column that differ by more than the LSD value are statistically significant. NS - Yields are not significantly different.

The Hoegrass - Glean treatment generally provided the most consistent yield responses at this location although the Hoegrass - Torch and Hoegrass - Buctril M treatments also provided similar yield responses in most years (Table 19). The effect of the Avadex BW - 2,4-D treatment was less consistent and was generally lower yielding than other herbicide treatments except the check.

TABLE 19 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Loon Lake - Herbicide Treatments Effects

Treatment	Year 1983	1984	1985	1986	1983 - 86 Avg.
Check - no herbicide	1002	2509	2103	558	1543
Hoegrass - Glean	1134	2784	2469	1432	1954
Hoegrass - Torch	1062	2795	2493	1373	1931
Hoegrass - Buctril M	1059	2681	2454	1480	1907
Avadex B W - 2,4-D	1000	2313	2506	1210	1782
LSD (P= 0.05)'	NS	101	135	96	68

' Yields in a vertical column that differ by more than the LSD value are statistically significant. NS - yields are not significantly different.

Fertilizer application increased yields over the check in all years of the study (Table 20) but yield differences between the high and low rates were not significant.

The herbicide X fertilizer interaction was significant in 1983 and in 1986. Yields of the unfertilized treatment where no herbicides were applied was very low in 1983 and fertilizer responses tended to be greater where herbicides were not applied. In 1986, fertilizer responses were quite small where no herbicide was applied but were much greater where herbicides were applied (Figure 5).

FIGURE 5 Effect of Herbicides on Yield REsponses to Fertilizer in a Continuous Wheat Rotation at Loon Lake (1986)

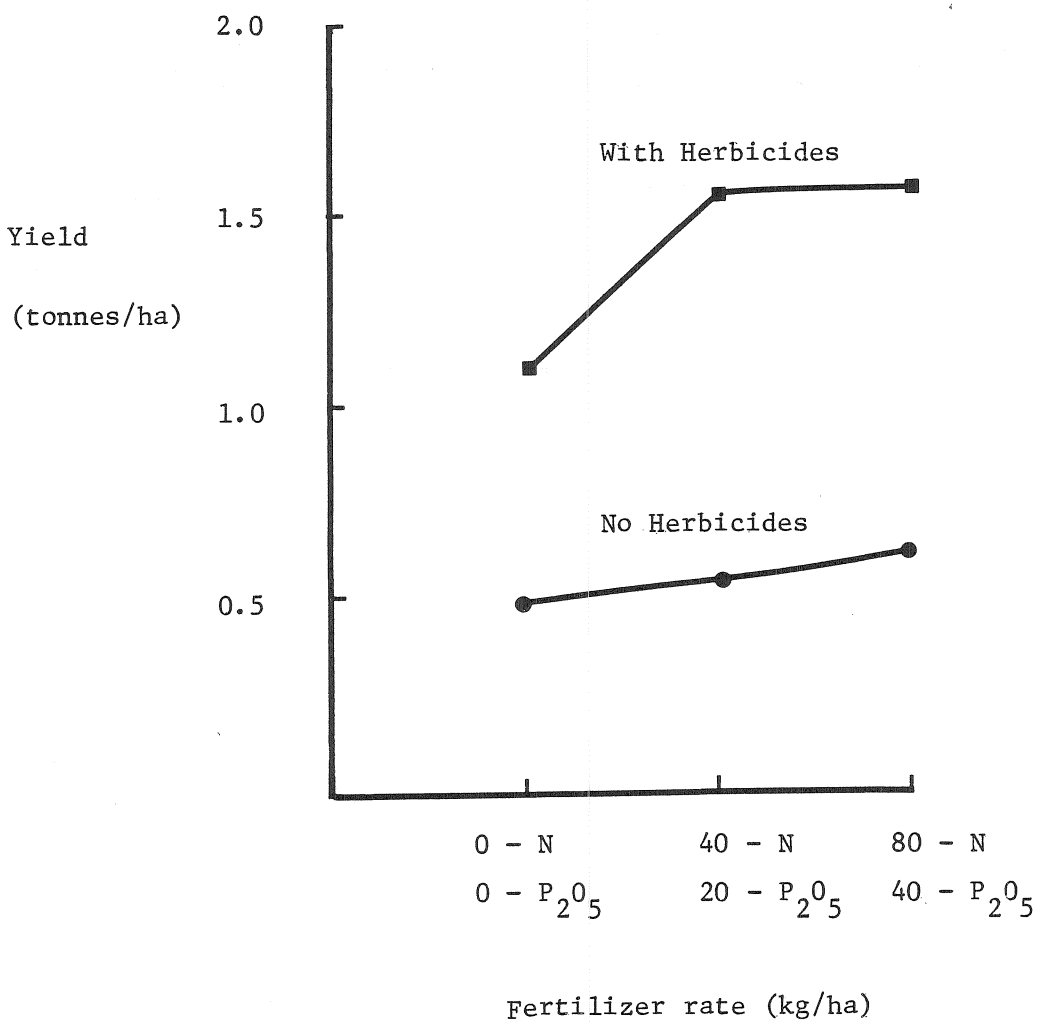


TABLE 20 Yields (kg/ha) of Wheat in a Continuous Wheat Rotation at Loon Lake - Fertilizer Treatment Effects

Treatment (kg/ha of N and P_2O_5)	Year				
	1983	1984	1985	1986	1983 - 86 Avg.
Check - no fertilizer	920	2398	2073	945	1584
40 - N 20 - P_2O_5	1126	2775	2560	1302	1941
80 - N 40 - P_2O_5	1131	2812	2520	1318	1945
LSD (P = 0.05)'	41	99	66	34	42

' Yields in a vertical column that differ by more than the LSD value are statistically significant.

SUMMARY: The yield data collected from all locations and years was analysed together. As would be expected, several significant interactions of years and locations with stubble, herbicide and fertilizer treatments occurred. For this discussion the year and location effects were excluded and only the management factors were considered. Results of the statistical analysis are given in Table 21.

Both the herbicide and fertilizer treatments had a highly significant effect on yields as did the stubble treatment X fertilizer treatment interaction. Stubble treatments alone significantly affected yields.

TABLE 21 Summary of Statistical Analyses Performed on Yield Data from a Continuous Wheat Rotation Study Conducted at Five Locations in West - Central and North Western Saskatchewan over 4 years (1983 - 86).

Factor	F Value	Probabilities
Stubble trt. (S)	5.03	0.011
Herbicide trt. (H)	58.53	0.000
S X H Interaction	0.79	< 0.500
Fertilizer trt. (F)	361.62	0.000
S X F Interaction	4.01	0.003
H X F Interaction	0.59	< 0.500
S X H X F Interaction	0.29	< 0.500

When analysed over all locations and years, leaving tall stubble as a snow trap significantly increased yields compared with leaving the stubble standing at a normal swathing height (short stubble) or where fall tillage was performed (Table 22). The overall yield response to leaving a tall stubble was relatively small compared with fall tillage and even smaller when compared with the normal height stubble treatment. However, the cost of leaving strips of tall stubble to trap snow is quite small and is generally less than the cost of a fall tillage operation.

The Hoegrass plus Glean and Hoegrass plus Torch herbicide treatments generally provided the most consistent yield responses. However, herbicide responses were quite variable from year to year at the various locations. In many

cases, populations of grassy weeds were not high enough to warrant use of Hoegrass or even Avadex. In some cases, populations of broadleaf weeds were quite low or they emerged much later than the crop and thus did not warrant the use of a broadleaf herbicide. These results point out the need to critically evaluate herbicide requirements, particularly when grain prices are low since greater yield responses are required to offset the costs. To make proper choices regarding use of herbicides and selection of herbicides to use requires a good knowledge of the species present, their relative abundance and competitiveness with the crop. On two occasions in this study, where weeds were very competitive with the crop, use of herbicides was essential to allow the crop to take advantage of the fertilizer applied.

Application of fertilizers increased yields at all locations in all years with one exception. In 1984 at Scott, very dry conditions resulted in a yield reduction where fertilizers were applied. In many cases, the yield response of the 80 kg/ha N plus 40 kg/ha P_2O_5 treatment over the 40 kg/ha N plus 20 kg/ha P_2O_5 treatment was not sufficient to offset the additional cost of fertilizer. This points out the need for soil testing to determine the amounts of fertilizer nutrients required. In general, yield responses to the 40 kg/ha N plus 20 kg/ha P_2O_5 rate were more than sufficient to offset the costs of the treatment.

The significant stubble treatment X fertilizer treatment interaction is interesting in that it indicates that fertilizer efficiency may be improved by snow trapping. Where no fertilizer was applied, yields from the tillage, short stubble and tall stubble treatments were similar (Figure 6). As the fertilizer rate was increased, the difference between stubble treatments became greater, with fall tillage giving the lowest yields and tall stubble highest yields.

TABLE 22 Wheat Yields in a Continuous Wheat Rotation at Five locations in West - Central and North Western Sask. over a Four Year Period (1983 - 86) as Affected by Stubble, Herbicide and Fertilizer Treatments.

	Yield (kg/ha)
Stubble Treatments	
- Fall Tillage	1984
- Normal Height Stubble	2051
- Tall Stubble	2129
LSD (P=0.05)'	66
Herbicide Treatments	
- Check, no herbicide	1784
- Hoegrass - Glean	2165
- Hoegrass - Torch	2178
- Hoegrass - Buctril M	2129
- Avadex BW - 2,4-D	2052
LSD (P=0.05)	47
Fertilizer Treatments	
- Check, no fertilizer	1628
- 40 kg/ha N - 20 kg/ha P_2O_5	2214
- 80 kg/ha N - 40 kg/ha P_2O_5	2323
LSD (P=0.05)	39

' Differences in yields in a vertical column that exceed the corresponding LSD value are statistically significant.